ISD Lessons Learned Process

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Responsible Office: 580/Information Systems Division (ISD) **Asset Type:** Process

Purpose

The purpose of the Lessons Learned process is to:

a) Capture lessons learned to allow ISD software projects and organizations to benefit from experiences gained in prior activities

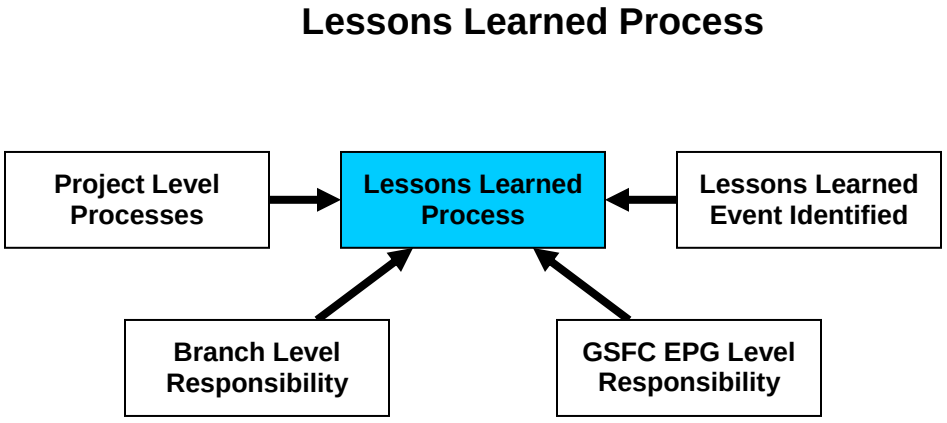
b) Share lessons learned with current and future ISD projects so that problems can be prevented from recurring and best practices can be replicated.

Scope

This process is applicable to all phases of the software development and/or maintenance effort, to ISD management, and to other ISD organizations, including those at the Branch and Division levels. It has activities on the project level, the Branch level, and the Division level.

This process is a standalone process that can be performed anytime lessons are learned. It can be started by a formal step from another process, an organization, or by an individual.

Context Diagram



Roles and Responsibilities

Product Development Lead (PDL) or Maintenance Technical Lead (MTL)

- Has leadership responsibility for implementing a Lessons Learned (LL) process across the full scope of activities within his/her area of responsibility
- Utilizes the expertise of individuals associated with System Engineering, Software Development, and Maintenance to support the identification and documentation of LL.
- Assigns responsibility to team members for implementation of LL efforts including conducting LL activities that cross multiple areas
- Ensures continuity and consistency of LL efforts across project
- Determines the value and benefit of applying LL to project activities
- Has ultimate responsibility for identifying, capturing, and applying LL

Branch Head (BH)

- Ensures continuity and consistency of LL efforts across Branch projects
- Utilizes the expertise of individuals associated with System Engineering, Software Development, and Maintenance to support the identification, capture and organization of LL
- Responsibilities can be delegated by BH

GSFC Engineering Process Group (EPG)

- Responsible for establishing GSFC software LL policy, procedures, guidelines and best practices
- Responsible for final organization, publication, and dissemination of LL to the GSFC software community
- Ensures that LL are consistent with GSFC policies, processes, procedures, guidelines, and best practices.
- Provides LL consulting to GSFC Program/Project teams

Usage Scenario

GUIDANCE: This process is entered and exited multiple times depending on what is being done and as a result produces multiple intermediate products.

Usage Scenarios:

- LL activities that usually occur at the Project level include planning, gathering and documenting LLs.
- LL activities that occur at the Branch level include, as needed, review of the submitted LLs, classification as to type, scrubbing to remove identifying project specific information, and submission to the GSFC EPG.
- LL review that occurs at the ISD (Division) level to determine if there are systemic reasons for problems and to determine what should be released to GSFC website, to the GSFC LL committee, and what should be disseminated to the end-users.

Inputs	*GUIDANCE: Only one input is required to start process for the project, the branch or the EPG.* • List of LL from project personnel • LL collected from managers and staff at Branch level, Division level, civil servants, suppliers, stakeholders, and customers. • Branch level scrubbed list of LL • LL Feedback Report from GSFC Software Process Improvement (SPI) website
Entry Criteria	*GUIDANCE: Only one entry criteria is required to start process for the project, the branch or the EPG.* • Occurrence of an event that produced a project Lesson Learned • Project Plan milestone has been reached • Major project scheduled event not met • Accident or mishap occurs that resulted in injury or potential injury • Request for a project LL meeting • Receipt of project level LLs and request for Branch LL review • Receipt of branch level scrubbed lists of LLs
Exit Criteria	*GUIDANCE: Only one exit criteria is required to exit process for the project, the branch or the EPG.* • New LL have been identified and documented • All LL that were submitted have been resolved • Any LL submitted to the EPG have been scrubbed of identifying project information • All scrubbed LL that were submitted have been analyzed, reviewed for use, and disseminated
Outputs	*GUIDANCE: Only one output is required to exit process for the project, the branch or the EPG.* • Documented project level LL • Branch level scrubbed lists of LL • Meeting minutes from Branch level LL reviews • Action items from Branch level LL reviews • Disseminated LL to GSFC LL committee and GSFC SPI website • Recommendations for changes to GSFC policies, processes, procedures, guidelines, and/or best practices

Major Tasks The following tasks shall be performed sequentially:

1.	**Plan**	**PDL, MTL**
2.	**Gather and Document**	**PDL, MTL**
3.	**Review within Branch**	**BH, PDL, MTL**
4.	**Analyze**	**EPG**
5.	**Disseminate**	**EPG**
6.	**Feedback and Correction**	**EPG**

Task 1 **Plan for Lessons Learned** **PDL, MTL**

a) Include regular LL identification, collection, and review events (Tasks 2 and 3) on the software project schedule.

b) Review proposed collection events with Branch management, who will need to support project team, by attending some or all of these events.

c) Review the NASA LL at http://nen.nasa.gov/portal/site/llis/ and the GSFC software LL at http://software.gsfc.nasa.gov/lessons.cfm for appropriate lessons to be incorporated into project use.

GUIDANCE: Schedule regular times to collect LL from the project team. These LL events should coincide with the major project milestone events, e.g., SSR, SCR, SDR, PDR, CDR, ATRR, MOR, FOR, ORR, major builds, integration into other major project parts, at project end, etc.

Task 2 **Gather and Document Lessons Learned** **PDL, MTL**

a) Solicit LL from project team members, managers and staff at Branch level, Division level, civil servants, suppliers, stakeholders, and customers at the regularly scheduled project events documented in Task 1.

GUIDANCE: For accidents or mishaps, see the Code 500 Applied Engineering and Technology Directorate Safety Program Plan, 500-PG-8715.1.

b) Solicit “best-in-class” examples of project products for the GSFC SPI website http://software.gsfc.nasa.gov.

GUIDANCE: Project products include Software Management Plans/Product Plans, Configuration Management Plans, Risk Plans, Work Breakdown Structures, status presentations, etc.

c) Document the “experience” encountered during software development and/or maintenance that produced some Lesson, whether it was a good outcome or resulted from some problem. Include what was done to get the good outcome or what failed including a possible solution.

d) Document the projects suggested “recommendation” that would either ensure a good outcome next time or fix the problem.

e) Categorize the LL with “key words” that could be used to find them within a database repository. Determine the project role for which the LL would be most relevant, the area of project interest most impacted, and the

project phase to which it relates.

f) Group the LL into classes (e.g., hardware, software, management, requirements, implementation, maintenance, operations).

g) Notify Branch management that there are LL that need to be reviewed in joint session with the project management.

GUIDANCE: Specific lessons to capture and share include:

- *problems, failures, incidents, anomalies and risks,*
- *issues, needs, results, and trends,*
- *"best in class" products, best practices, and pitfalls to avoid,*
- *design/decision processes and rationale.*

Lessons may be gleaned from numerous existing resources such as;

- *weekly activity reports and monthly status reviews,*
- *independent review team reports (e.g. software release post-mortems);*
- *top-ten lists,*
- *requests for actions and associated closure reports,*
- *after-action reviews,*
- *final reports, and*
- *case studies.*

Task 3 **Review Lessons Learned within Branch** **BH, PDL, MTL**

a) Review the LL with Branch management. Assign actions within the Branch to respond to the LL; either to prevent similar problems from recurring or to institutionalize practices found to be beneficial.

b) Scrub the LL that will be sent to GSFC EPG to remove any project specific identifying information.

c) Submit scrubbed LL to GSFC EPG along with the description of actions taken at the Branch level.

GUIDANCE: This task is a Branch level activity. There should be one PDL or MTL from each Branch project plus the designated representative for the BH.

Task 4 **Analyze Lessons Learned** **EPG**

a) Review the submitted LL and actions from the Branches to assess the general applicability of the underlying reason(s) or systematic element(s) that gave rise to this condition.

b) Verify LL for consistency with GSFC policies, processes, procedures, guidelines, and best practices.

c) Determine what, if any, changes to current GSFC policies, processes, procedures, guidelines, and best practices should be considered to address the LL.

d) Make determination of what LL are approved for dissemination.

e) Determine which LL should be submitted to the GSFC LL committee who will then decide if this should be submitted to NASA LLIS, the agency wide LL site.

Note: Only Mission Project and major LLs should be provided to GSFC

LL committee.

f) Document the results of this analysis.

GUIDANCE: This task is performed by a representative of the GSFC EPG and the designated representatives of the BHs, i.e., one designated representative from each Branch. The purpose of this analysis is to identify those common threads or repeating factors so that:

- *Positive results can be repeated in subsequent projects*
- *Negative results or impacts can be minimized or avoided*

Task 5 **Disseminate Lessons Learned** **EPG**

a) Package LL for distribution.

b) Submit new validated LL to:

- GSFC SPI Web site at http://software.gsfc.nasa.gov/
- E-mail distribution of alerts/updates, meetings, teleconferences, workshops, working groups, employee exchange, training, mentoring, and conferences.
- GSFC LL committee

Note: Only Mission Project and major LLs should be provided.

- NASA Technical Standards Web Site at http://standards.nasa.gov/NPTS/login.taf

GUIDANCE: Make lessons, and/or summaries of lessons, available to those individuals, groups, or projects within the ISD that have the best opportunity to apply them. Dissemination of LL includes both providing convenient access to resources of direct and indirect interest and forwarding alerts/updates to individuals willing to receive such information without having to search for it. The GSFC SPI website provides a way for individuals to subscribe for these updates on a voluntary basis.

Task 6 **Feedback and Correction of Lessons Learned** **EPG**

GUIDANCE: ISD individuals, groups, or projects that receive lessons can provide feedback via the GSFC SPI website if they find some problem.

a) Periodically, i.e., when inputs are available, review GSFC SPI website Feedback Reports and determine corrective actions needed to address the feedback. Ensure that these corrective actions include development and/or improvement of process assets, when appropriate.

b) Review the relevance of current LL in the database to minimize obsolescence and usability. Determine what changes are needed to address problems discovered.

c) Document the results of the feedback and relevance reviews.

d) Monitor corrective actions until they have been completed.

e) Package updated or corrected LL for distribution.

f) Submit updated or corrected LL to those distribution sources listed in

Task 5b.

Measures

Recommended Measures:

- Number of new submissions of LL
- Number of the new submissions that were accepted and distributed

Required Measures

- No measures were identified

Tools and Templates

Name	Description
FSW LL Tool	See http://software.gsfc.nasa.gov/tools.htm
GSFC LL website	See http://software.gsfc.nasa.gov/lessons.cfm
GSFC LL Feedback Form	See http://software.gsfc.nasa.gov/lessons.cfm
NASA LL website	See http://nen.nasa.gov/portal/site/llis/

Training

Course Name	Description
None	No training courses were identified

Training availability can be checked at http://software.gsfc.nasa.gov/training.htm.

References

This process is consistent with the following policies, standards & references.

- **Glossary:** http://software.gsfc.nasa.gov/glossary.cfm
  Defines common terms used in ISD processes
- **Process Asset Library:** http://software.gsfc.nasa.gov/process.cfm
  Library of all ISD process descriptions
- **ISD Software Policies:** http://software.gsfc.nasa.gov/
- **NASA Software Engineering Requirements:** NPR 7150.2, http://nodis.hq.nasa.gov/
- **NASA Lessons Learned:** NPR 7120.6, http://nodis.hq.nasa.gov/
- **NASA Procedural Requirements for Mishap Reporting, Investigating, and Recordkeeping:** NPR 8621.1, http://nodis.hq.nasa.gov/
- **GSFC Reporting of Mishaps and Close Calls:** GPR 8621.1, http://nodis.hq.nasa.gov/
- **Applied Engineering and Technology Directorate Safety Program Plan:** 500-PG-8715.1, http://nodis.hq.nasa.gov/

Quality Management	Controlled Document / Description	Record Custodian

System Records		
	None were identified	

Change History	Version	Date	Description of Improvements
	1.0	5/25/06	Initial approved version by CCB